

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Patent Application No. 10/668,451

Applicant: Williams et al.

Filed: September 22, 2003

TC/AU: 3736

Examiner: Jeffrey Gerben Hoestra

Docket No.: 229278 (Client Reference No. 4015US)

Customer No.: 23460

**AMENDED APPELLANTS' APPEAL BRIEF**

Mail Stop Appeal Brief – Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

In support of the appeal from the final rejection dated March 25, 2008, and in response to the Notice of Non-Compliant Appeal Brief dated November 13, 2008, Appellants now submit their Amended Appeal Brief.

*Real Party In Interest*

The patent application that is the subject of this appeal is assigned to Volcano Corporation.

*Related Appeals and Interferences*

There are no appeals or interferences that are related to this appeal.

*Status of Claims*

Claims 1, 3-12 and 14-20 stand finally rejected, and these rejections are presently being appealed. Claims 2 and 13 have previously been cancelled.

*Status of Amendments*

There were no amendments submitted after the final rejection.

*Summary of Claimed Subject Matter*

Independent claims 1 and 12 and dependent claims 3-11 and 14-20 are pending. The summaries of the independent claims, and the separately argued dependent claims, reference the specification and drawings filed with the application on September 22, 2003.

Independent **claim 1** pertains to a sensor catheter (see, generally FIGS. 1-2). The catheter sensor includes a catheter 12. A proximal end of the catheter 12 is adapted to be coupled to a processing unit 14. A sensor assembly 16 is disposed at a distal end of the catheter 12. A plurality of wires 18, coupled to the sensor assembly 16, carry signals along the length of the catheter 12.

The plurality of wires 18 connected to the sensor assembly 16 are divided into at least first and second wire bundles (e.g., 24 and 26) to reduce electromagnetic interference (e.g., cross-talk) between the sets of signals carried by the wires (see, page 5, lines 9-25). The first and second wire bundles (e.g. 24 and 26) are further twisted together and disposed within an outer conductor sheath (30). *See*, FIGS. 4-6; and page 6, lines 22-24.

Independent **claim 12** pertains to a sensor catheter (see, generally FIGS. 1-2). The sensor catheter includes flexible elongate member 12. A proximal end of the flexible elongate member 12 is adapted to be coupled to a processing unit 14. A sensor assembly 16 is disposed at a distal end of the flexible elongate member 12. A plurality of wires 18, coupled to the sensor assembly 16, carry signals along the length of the flexible elongate member 12.

The plurality of wires 18 connected to the sensor assembly 16 are divided into at least first and second wire bundles (e.g., 24 and 26) to reduce electromagnetic interference (e.g., cross-talk) between the sets of signals carried by the wires (see, page 5, lines 9-25). The first and second wire bundles (e.g. 24 and 26) are further twisted together and disposed within an outer conductor sheath (30). *See*, FIGS. 4-6; and page 6, lines 22-24.

Dependent **claim 10** further recites that the wires 10 in the first and second bundles 24 and 26 are twisted in opposite directions. *See*, page 7, lines 29-32.

Dependent **claims 11 and 20** further recite that wires 10 in the first and second bundles 24 and 26 are twisted in the same direction and the first and second bundles 24 and 26 are twisted in a direction opposite to the direction in which the individual wires are twisted. *See*, page 8, lines 2-4.

*Grounds of Rejection to be reviewed on Appeal*

The grounds of rejection to be reviewed on appeal are the grounds stated in the Final Office Action mailed on March 25, 2008. In particular, Appellants appeal the rejection of claims 1, 3-12, and 14-20 as obvious under 35 U.S.C. §103 over U.S. Patent No. 5,795,325 (Valley) in view of U.S. Patent No. 5,591,142 (Van Erp).

*Argument*

Rejection of claims 1, 3-12 and 14-20 over Valley in view of Van Erp

**Claims 1, 3-9, 12 and 14-19**

Appellants submit that the Final Office Action's rejection of **independent claims 1 and 12** as obvious over Valley in view of Van Erp is in error. In particular, the recited invention is not obvious since the combination of Valley and Van Erp do not teach, to one skilled in the art at the time of the invention: (1) modifying Valley's catheter to include multiple bundles of wires coupled to the same sensor assembly, or (2) modifying Valley to include multiple bundles that are twisted together while at the same time twisting the individual wires within each bundle.

Claims 1 and 12 recite a catheter with an arrangement of wires used to connect a sensor assembly at the distal end of the catheter to its proximal end. The claimed arrangement of wires has the following characteristics: (a) the wires connected to the sensor assembly are arranged in at least two different bundles, (b) the wires in each bundle are twisted together to reduce electromagnetic interference, and (c) the wire bundles are twisted together and disposed within an outer conductor sheath.

Valley, upon which the Final Office Action relies, discloses that individual sensors may be connected to signal wires that form parallel pairs, twisted pairs or coaxial cables. *See*, Valley, col. 19, lines 22-26. However, Valley does not disclose that multiple bundles (i.e. pairs of signal wires) are in turn twisted together as recited in claims 1 and 12. Nor does Valley disclose that the wire bundles are disposed within an outer conductor sheath as also recited in claims 1 and 12. The Final Office Action acknowledges that these elements are missing from Valley. *See*, Final Office Action dated March 25, 2008 at Par. 6. Although not addressed in the Final Office Action, Appellants further submit that Valley fails to disclose multiple bundles of wires connected to the same sensor assembly. Instead, Valley discloses that each bundle is connected to a different sensor. *Id.*, col. 17, lines 23-30 and lines 52-59, and col. 18, lines 47-51 (signal wires 334 and 336 are connected to pressure transducer 330, signal wires 339 and 341 are connected to proximal pressure transducer 331, and signal wires 352 and 354 are connected to balloon pressure monitoring transducer 350).

To fill the gaps in the disclosure of Valley, the Final Rejection relies upon the teachings of Van Erp. Appellants agree that Van Erp does disclose a catheter with multiple “bundles” of wire 10. *See* Van Erp, FIG. 3. However, each bundle is connected to a separate sensor (e.g. 5 and 9). *See* FIGs. 2A and 2B. Thus, the combined teachings of Valley and Van Erp do not provide for “a plurality of wires coupled to the sensor assembly, wherein the plurality of wires are divided into first and second bundles” as claimed. At best, Valley and Van Erp teach multiple bundles of wire wherein each bundle is connected to a separate and distinct sensor assembly.

Moreover, while Van Erp discloses that the wire bundles can be wrapped around a catheter core in an overlapping fashion, Van Erp specifically teaches that, in such an arrangement, *it is important for the wires within each bundle to be disposed side by side and in parallel*. *See id.*, col. 3, lines 54-58 (“The side by side arrangement of the metal wires 11 in each bundle 10 with no single wire in a bundle overlying another single wire in the bundle enables the tubular body of the catheter 3 to have a very thin wall.”) In this regard, Van Erp teaches away from the claimed arrangement wherein the individual wires within a bundle are twisted together. *See KSR Int’l Co. v. Teleflex Inc. et al.*, 127 S.Ct. 1727, 1740 (2007) (“when the prior art teaches away from combining certain known elements, discovery of a successful means of combining

them is more likely to be nonobvious”) *citing Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 51-52 (1966).

Thus, a person of ordinary skill in the art fairly reading Valley in view of Van Erp would, at best, incorporate the multiple bundles of wire from Van Erp into the catheter design of Valley. However, in doing so, the individual wires in the bundles would run side by side in a parallel fashion and would not be twisted together as claimed so as to minimize the thickness of the catheter wall as taught by Van Erp. No *reason* has been provided as to why such express teachings as set forth in Van Erp would be disregarded by a person of ordinary skill in the art. *See KSR Int’l* 127 S.Ct. at 1742 (noting that it may be “important to identify a reason that would have prompted a person of ordinary legal skill in the art to combine the elements as the new invention does.”)

Because the combination of Valley and Van Erp do not teach multiple bundles of wire connected to a single sensor assembly and does not fairly teach twisting together individual wires within multiple bundles of wire, Appellants request that the Final Rejection of independent claims 1 and 12 be reversed. For at least the same reasons, the Final Rejection of dependent claims 3-11 and 14-20 should also be reversed.

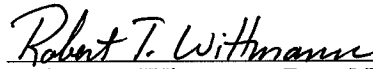
### **Dependent Claims 10, 11, and 20**

Claim 10 recites an arrangement wherein the wires of the first and second bundles are twisted in different directions. Claims 11 and 20 recite an arrangement wherein the wires of the first and second bundles are twisted in a first direction and the first and second bundles are twisted in a second direction that is opposite to the first direction. Valley discloses twisted pairs. However, Valley is silent as to the relative direction in which distinct pairs are twisted. Valley also does not disclose that the twisted pairs are in turn twisted together. Van Erp discloses that the wires in the bundle are side by side and not twisted at all. As such, the combined teachings of Valley and Van Erp fail to teach the features of claims 10, 22 and 20 for this additional reason.

*Conclusion*

For the reasons stated herein above, the presently pending claims are patentable over the prior art presently known to Appellants. Appellants therefore request reversal of the presently pending rejection of claims 1, 3-12 and 14-20.

Respectfully submitted,



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Robert T. Wittmann, Reg. No. 54,549  
LEYDIG, VOIT & MAYER, LTD.  
Two Prudential Plaza  
180 North Stetson Ave., Suite 4900  
Chicago, Illinois 60601-6731  
(312) 616-5600 (telephone)  
(312) 616-5700 (facsimile)

Date: December 3, 2008

*Claims Appendix*

1. A sensor catheter, comprising:  
a catheter having proximal and distal ends, a proximal end of the catheter adapted to be coupled to a processing unit;  
a sensor assembly disposed at the distal end of the catheter; and  
a plurality of wires extending from the proximal end of the catheter to the distal end of the catheter, the plurality of wires coupled to the sensor assembly,  
wherein the plurality of wires are divided into first and second wire bundles, each of the wires in the first and second wire bundles twisted together to reduce electromagnetic interference between the wires, and wherein the plurality of wires carry control signals transmitted to the sensor assembly and sensor signals transmitted from the sensor assembly, and wherein the first and second wire bundles are twisted together and disposed within an outer conductor assembly sheath having an inner wall forming a space containing the first and second wire bundles of the plurality of wires.
2. (Cancelled)
3. The sensor catheter of claim 1 wherein the plurality of wires further are divided into a third wire bundle, each of the wires in the third wire bundle twisted together to reduce electromagnetic interference between the wire bundles.
4. The sensor catheter of claim 1, wherein the first wire bundle consists of a pair of wires.
5. The sensor catheter of claim 4, wherein the pair of wires is twisted together in a clockwise direction.
6. The sensor catheter of claim 4, wherein the pair of wires is twisted together in a counter-clockwise direction.
7. The sensor catheter of claim 1, wherein the second wire bundle consists of a pair of wires.
8. The sensor catheter of claim 3, wherein the third bundle consists of three wires.

9. The sensor catheter of claim 3, wherein the first, second and third wire bundles are twisted together and disposed within the outer conductor assembly sheath.

10. The wiring arrangement of claim 1, wherein the wires in the first wire bundle are twisted together in a first direction and the wires in the second wire bundle are twisted together in a second, substantially opposite direction.

11. The wiring arrangement of claim 1, wherein the wires in the first wire bundle are twisted together in a first direction and the wires in the second wire bundle are twisted together in the first direction, and the first and second wire bundles are twisted together in a second direction substantially opposite to the first direction.

12. A sensor catheter, comprising:  
a flexible elongate member having proximal and distal ends, a proximal end of the flexible elongate member adapted to be coupled to a processing unit;  
a sensor assembly disposed at the distal end of the flexible elongate member; and  
a plurality of wires extending from the proximal end of the flexible elongate member to the distal end of the flexible elongate member, the plurality of wires coupled to the sensor assembly,

wherein the plurality of wires are divided into first and second wire bundles, each of the wires in the first and second wire bundles twisted together to reduce electromagnetic interference between wires in the first and second wire, and wherein the plurality of wires carry control signals transmitted to the sensor assembly and sensor signals transmitted from the sensor assembly, and wherein the first and second wire bundles are twisted together and disposed within an outer conductor assembly sheath having an inner wall forming a space containing the first and second wire bundles of the plurality of wires

13. (Cancelled).

14. The sensor catheter of claim 12 wherein the plurality of wires further are divided into a third wire bundle, and each of the wires in the third wire bundle are twisted together.



15. The sensor catheter of claim 12, wherein the wires in the first wire bundle are twisted together in a clockwise direction.

16. The sensor catheter of claim 15, wherein the wires in the second wire bundles are twisted together in a counter-clockwise direction.

17. The sensor catheter of claim 12, wherein at least one of the first and second wire bundles consists of a pair of wires.

18. The sensor catheter of claim 14, wherein the third wire bundle consists of three wires.

19. The sensor catheter of claim 14, wherein the first, second and third wire bundles are twisted together and disposed within the outer conductor assembly sheath.

20. The wiring arrangement of claim 12, wherein the wires in the first wire are twisted together in a first direction and the wires in the second wire bundle are twisted together in the first direction, and the first and second wire bundles are twisted together in a second direction substantially opposite to the first direction.

*Evidence Appendix*

NOT APPLICABLE

*Related Proceedings Appendix*

NOT APPLICABLE